

CULTURE PHASE DIVISIONS SUGGESTED BY TYPOLOGICAL CHANGE COORDINATED WITH STRATIGRAPHICALLY CONTROLLED RADIOCARBON DATING AT SAN DIEGO

James Robert Moriarty *
University of California at San Diego

ABSTRACT

Until quite recently there has been insufficient information on the earlier cultures in San Diego and West Imperial Counties, California to warrant an attempt to divide them into phases. The value of well defined culture phases, based on typological change in artifacts, burial practises, skeletal characteristics or other criteria, has long been acknowledged. With caution, one may now begin the construction of such phases for two of the three known cultures in these areas. Radiocarbon dates for stratigraphically-controlled archaeological sites are now sufficiently abundant for co-ordination with specific typological changes in these cultures. In many cases the dates give a relative indication of the time of first appearance (in specific areas) of trade materials and of changes in food-gathering practises and burial customs. Although the chronologies are not absolute, because of the errors inherent in radiocarbon dating and human interpretation, there are enough data now for a definite, dated sequence of cultural trait changes, from the earliest to the most recent occupants of San Diego County.

San Dieguito:

Three cultures have continuously occupied sites in San Diego County for the last 9,000 years (Hubbs, Bien & Suess, 1965; Moriarty, 1966). The earliest was a Pre-Desert or Hunting Culture called the San Dieguito. In all probability it originated in the Great Basin area, then moved into Southern California between 10,000 and 11,000 years ago (Moriarty, *et al.* 1960; Warren, *et al.* 1961; Warren, 1964; Meighan, 1965). The San Dieguito occupation occurred during a period of fairly rapid sea-level advance (Shepard, 1964; Curray, 1965). Therefore the shore line where the most westward extension of the culture would have had camps was already being transgressed by the rising sea. The river valley sites and those farther inland were not affected, except indirectly. The changing climatic conditions, which brought about our present semi-arid environment,

eventually would greatly affect the more inland dwellers of the culture. The earliest sites of the shore line people, first to be influenced, are probably lost to us forever, as they now lie below sea level out to the 10-fathom curve. The earliest identifiable San Dieguito material found along the present coast is well into a transition phase, from which the Desert or Milling Culture known as the La Jolla (Rogers, 1939, 1958) apparently evolved.

Pre-San Dieguito:

It is necessary at this point to interject at least one other interpretation with regard to the earliest sequence of occupation along the San Diego County coast. The possibility of a still earlier milling or grinding culture has been advanced for some time (Carter, 1957). Evidence for this is based on a small number of metates and manos recovered from geologically-dated strata at Crown

* I wish to thank Mrs. Norma Moriarty for her careful editing and manuscript preparation, with special appreciation to Mr. Carr Tuthill of Scripps Institution of Oceanography-U.C.S.D., La Jolla, California for his very careful and important criticisms.

Point Strand and La Jolla in the city of San Diego. These areas have been partly destroyed by grading and are covered with buildings. It is therefore impossible to obtain samples for dating or to conduct excavations. Shore line sites of a pre-San Dieguito period would be below 20 fathoms (Fig. 1). No dates earlier than 9,000 B.P. are recorded for any site in San Diego County. If we assume, therefore, a pre-10,000 B.P. coastal plan occupation by an unknown Desert Complex, it is necessary to postulate the migration of a Desert Culture into California at a period equal to the earliest radiocarbon-dated cultures in North America. Until carefully selected radiocarbon samples are taken from milling-tool-bearing strata in the proper vertical sequence, there can be no positive answer. We must content ourselves, for the time being, with the sequence of the San Dieguito Culture migrating into California between 10,000 and 11,000 years ago and occupying isolated camps scattered throughout San Diego County. Changes in the fauna and flora, brought about by climatic change, moved this hunting people into a transitional phase. It began some time before 9,000 B.P. and extended to around 7,500 B.P.

La Jolla I:

La Jolla I begins with the end of the transitional phase. At this time the typology of the artifact assemblage becomes that of a Desert Culture. The basic artifacts (i.e., big bifaces) of a Pre-Desert Culture, which had been carried into the transition phase, disappear and are replaced by crude, flat-surfaced milling slabs and shallow-basined unshaped metates. These are accompanied by manos, both unifaced and bifaced, that were manufactured from cobbles easily obtained from conglomerate lenses in the sea cliffs and from the beach. The mineralogical content of the lithic materials used for the manufacture of La Jolla I artifacts supports the foregoing statement as to their origin. It is therefore one of the main criteria for the definition of the La Jolla I. The transitional-phase artifacts

indicate a change from felsitic and more chert-like minerals (i.e., minerals with a distinctive and controllable conchoidal fracture) to the more local rhyodacites, meta-quartzites, and diabases. This change in the choice of materials is complete by 7,500 B.P. Henceforth there is a distinctly recognizable reliance upon minerals occurring at or near the sites. The artifact assemblage is based on a rather crude cobblestone, chopper, and scraper typology, all of which is percussive. There is little or no sophistication in the technology of the earliest stone work. There is, however, a discernible increase in stone-working ability and in the variety of artifact types and sizes as one approaches the younger strata.

One other criterion further defines La Jolla I. No human remains have been discovered from the San Dieguito or the transitional periods, both of which date before 7,500 B.P. The first known burials occur in the lower levels of La Jolla I. These are complete inhumations, flexed and unsegregated. No attempt at directional orientation is found in the La Jolla I phase burials. Occasional mortuary ornaments have been found in the form of rather crude, large (1-2 cm.) shell beads, but these are quite rare. Sometimes an artifact (hammerstone, chopper, scraper, etc.) has been found. Such were probably surface debris and are most likely accidental intrusions, rather than purposely placed offerings. Throughout the 2,000 or more years of La Jolla I, there is little addition or change in the artifact assemblage. This indicates, I feel, a stable food-gathering economy, with a fairly sedentary base and limited movement or contact with other related groups.

La Jolla II:

La Jolla II begins around 5,500 B.P. Additions to the artifact assemblage now appear. There is no evidence that the additions are of independent origin. Rather, indications are that they probably represent the first tenuous contacts with the more northerly coastal and Channel Island cultures. We now have

the appearance of drilled and polished stone artifacts. Small stone beads and pendants, roughly polished and drilled, form part of the material in burials. Polished stone discoids and balls make their first appearance and occur throughout La Jolla II (Moriarty and Brome, 1966). There is an increase in the variety of bifaced artifacts. Crude percussive techniques have given way to more subtle work that produced smaller, more-refined tools. The reappearance of projectile points occurs in the middle and upper levels of La Jolla II. These are of four specific types: 1) lanceolate, relatively small (7-8 cm.), bifaced, and somewhat reminiscent of the larger lanceolate forms found in the San Dieguito; 2) a small triangular point with rounded flanges and a concave base; 3) nearly an equilateral triangle with a convex base; and 4) a large blade with fairly long parallel sides, again reminiscent of one of the earlier San Dieguito types, having both rounded and straight bases (Fig. 2). Types 2 and 3 may well have their origins to the north and east of San Diego, for both designs have considerable antiquity in this region (Campbell & Campbell, 1937).

The final definitive change is in the burial practices of La Jolla II. During this phase, flexed burials are now generally oriented significantly (i.e., head north, face east), and segregated into cemeteries. The occurrence of mortuary offerings is now the rule. These include beads and pendants of shell or stone, as well as utilitarian items such as metates, manos, scrapers, and choppers. The metates usually are placed over the head and upper part of the body. There is insufficient evidence to indicate whether or not any of these items have been "killed". There is a fairly equal distribution of unbroken and broken artifacts in La Jolla II burials. Some investigators have noted a greater amount of food-bone and shell material in some burials than is indicated by the content of the surrounding or enclosing midden in which many La Jolla II burials are found (Shumway, *et al.*, 1961). Although the evidence for this is rather tenuous, this was a well de-

veloped practice in La Jolla III and may have had its beginnings in phase II.

La Jolla III:

La Jolla III begins 4,000 years B.P. It is marked by a distinct change in the geographic locale of sites. There is good evidence that the coastal dwelling La Jolla people were forced to move their sites to lower elevations and along the edges of a series of coastal lagoons in San Diego County (Moriarty, 1963 and 1966; Hubbs, Bien and Suess, 1965). Climatic change over the past 7,000 to 8,000 years has brought about a drying up of the higher springs and streams that had been the sources of water for La Jolla I and II Sites. As the water table lowered, imperceptibly over the succeeding millennia, the more elevated sources became less and less dependable, eventually forcing abandonment of the sites (Hubbs, Bien and Suess, 1960, 1962, 1963, and 1965; Moriarty, 1963 and 1966; Meighan, 1965). The coastal occupants logically could re-establish themselves farther inland where the water sources were still dependable, or in lagoonal areas where the upper portions of the lagoon were still fed by the deeper and permanent water table. Sea level at this period was approximately 30 to 40 feet lower than it is at present (Fig. 1). The lagoon and beaches, consequently, were farther out than they are now. The continuously rising sea level had established a constant cycle of recession landward and rebuilding of the barrier bars fronting the lagoons (Moriarty, 1963). Many of the sites were established on or near these barrier beaches; their constant occupation from 4,000 or more years ago has placed a sheet of artifact material on the near-shore sea bottom, extending offshore from the present beach to the 30 or 40 feet curve (Tuthill and Allenson, 1954; Carter, 1955; Moriarty, 1963 and 1966; Marshall and Moriarty, 1964). Archaeological evidence of the abandonment of many of the elevated sites at this period is extensive and is additionally substantiated by radiocarbon dates (Hubbs, Bien and Suess, 1960-1965). Examina-

tion and testing for submerged archaeological sites have produced evidence of these sites so far north as offshore Avila Beach in central California and to the south at Imperial Beach on the Mexican border. In each case the physiographic environment of lagoon and barrier beach, bracketed by sea cliffs or heights, was present. Early sites that were abandoned after 5,000 B.P. were found on the heights. Underwater, in the near-shore areas, artifacts were found out to the 30 or 40 feet depth curve (Moriarty and Burns, 1963; Marshall and Moriarty, 1964; Moriarty, 1963). Collecting artifact assemblages from the submerged sites has proved to be a long and arduous task. Examination of the underwater finds, in relation to our present knowledge of sea level rise and Southern California palaeontology, add support to Meighan's view, as expressed in his summation of Pacific Coast archaeology in the review volume, *The Quaternary of the United States*. Meighan states that "The southern dates clearly apply to a widespread cultural horizon to which Wallace (1955) gave the term Early Milling Stone Horizon. Various site names and cultural terms have been applied to this horizon: Oak Grove, Topanga, Zuma Beach, and La Jolla. Although some regional differences can be seen, a general cultural uniformity exists from Avila (San Luis Obispo County) to about half way down the peninsula of Baja California." The materials taken from underwater sites continue to show this uniformity, with a slight but increasing diversification as the artifacts become younger in age, when the present shore line is approached. Radiocarbon dates on underwater outcrops of the submerged lagoon deposits correlated perfectly with the period for the abandonment of the elevated sites (Hubbs, Bien & Suess, 1960-1965). Dates on shore line sites plainly demonstrate that the sea at La Jolla reached its present stand generally between 2,000 and 3,000 B.P.

Diegueño I

There is a layer of Diegueño (Yuman) material overlying the La

Jolla at U.C.L.J.-M-6 (Beach and Tennis Club Site), beginning at the mean lower low-water datum level. It was first noted by Malcolm J. Rogers (personal communication, 1958) that there was no stratigraphic break between the La Jolla and the Diegueño on this site. The indications were that the La Jolla merged with the Diegueño. Investigation of the low-level terrace and slope directly to the south led to the discovery of a site that, when excavated, demonstrated in its vertical profile the entire sequence from La Jolla II, at the base, through Diegueño I. Radiocarbon testing at 5-decimeter increments throughout the vertical extent of the midden indicated an unbroken sequence of occupation. The beginning of cremation practises and the cessation of inhumation dates from about 2,500 B.P. It appears that the process of amalgamation between the two cultures covered a relatively long period, beginning about 3,000 B.P. and extending to about 2,000 B.P. This process, of course, had its beginnings with the first trading the coastal La Jolla people had with the Yuman culture to the east. However, it is not until around 3,000 B.P. that enough Yuman additions occur in the artifact assemblage to allow us to infer a settling of Yuman peoples among the La Jolla on the coast. The amalgamation is marked by an increase in the diversification of pressure-flaked artifacts. The variations and importation of mineral types expands with quartzites, obsidian, felsites, and crypto-crystalline materials now beginning to appear in quantity. There is as yet insufficient evidence to make any definite statement with regard to changes in burial practises. A burial, totally unlike any previously known from the La Jolla culture, was discovered at the Spindrift Site. It was an adult male, completely extended on his back. Surrounding the body in a rectangular pattern were 37 large specimens of a common marine shell (*Tivela stultorum*). Covering the head was a fragment of a deep-basined metate. One large abalone filled with small pieces of charcoal and food-bone material was discovered at the feet. The long axis of

the body was N-S, with the head to the north. A deep-trenching machine had destroyed most of another burial at the same level. Examination showed the same orientation. It was also outlined with shells. Because of its disturbed condition, no other conclusions as to mortuary offerings could be made. The sequential radiocarbon dates indicate that these burials fall in a period just before 3,000 B.P. They are directly over typical La Jolla Phase II and III flexed burials. Stratigraphically, they occur just below the dated cremation level. The inferences seem obvious. From the evidence it appears that around 3,000 B.P., elements of the westernmost Yuman were beginning to merge with the coastal La Jolla. The mixing of the two cultures brought about changes distinguishable in the artifact assemblage, and possibly resulted in a modification of burial practises. Whether this was a peaceful merging or the more dynamic Yuman people came as invaders and assimilated the La Jolla survivors is not known. The archaeological evidence tends to suggest a peaceful merging over a fairly long period.

The beginning of the Diegueño I phase is principally defined by the appearance of cremation practises for the disposal of the dead (Rogers, 1945). Various types of projectile points are made, while others are obtained by trade. Knowledge of manufacture and use of the bow can be safely inferred. Unfortunately, however, no date can be given for the primary appearance of this most useful weapon and tool on the San Diego Coast. No organic material such as wood or leather (excepting under very rare circumstances) has been preserved in early Diegueño sites. The conditions necessary for such preservation do not exist in our coastal environment (Meighan, 1965; Moriarty, 1966). There is a tradition for the use of fire-hardened spears and wooden projectile points among the Yuman peoples of Southern California that undoubtedly has considerable antiquity (Kroeber, 1925). As a consequence, even though a tentative date of 2,500 to 3,000 B.P.

can be placed on some types of stone points (i.e., those that are historically identified as arrow points), we cannot be sure that they represent the earliest appearance of the bow in San Diego County. Percussion is still used in Diegueño I for manufacturing many stone tools. Pressure flaking of fine technique is used for retouch and final shaping. Arrow-shaft straighteners, tube-shaped stone smoking pipes (steatite), cylindrical pestles (polished and occasionally phallic), large stone mortars (30-60 pounds), and cigar-shaped charm stones now form part of the artifact assemblage (Fig. 3).

The appearance of pottery and cremation in San Diego Coastal sites has been the primary means of identifying a site or a stratigraphic level as Diegueño. There is good evidence of variations or modifications in cremation practises from certain sites (LJ-897, LJ-103, and LJ-386). Radiocarbon dates correlated with these variations indicate an evolution from a simple pit-cremation to the creation of special cremation areas with cobble-lined cremation pits. Very specialized and segregated cremation areas were discovered in northern San Diego County near Vista and at Witch Creek.

It is difficult to say to what extent the variations in Diegueño cremation practises were caused by the influence of their non-Yuman neighbors. Both the eastern and the western Diegueño were bordered on the north by the Luiseño, the Cahuilla, and the Cupeño. A study of the origins of religious and ceremonial practises suggests that the Diegueño borrowed some ideas and rituals from their northern neighbors (Kroeber, 1920 and 1925; Moriarty, 1965). This, however, does not appear to have been an extensive practise. Those semi-independent Diegueño tribellets that lived in close contact with non-Yuman peoples tended to show borrowed traits in their ceremonies to a far greater extent than did their relatives to the south. The development of stone-paved cremation pits and the setting aside of areas specifically for cremations undoubtedly reflect this influence. A very advanced procedure in the evolu-

TABLE I.

All of the radiocarbon dates listed in this table were processed by the Scripps Institution of Oceanography Natural Radiocarbon Laboratory. I have avoided using some dates because of the possibility of sampling error. Although there are well developed methods for sampling archaeological sites, the possibility of contamination in a sample is always present. Usually this is caused by material intrusions at lower levels due to the filling of animal burrows. The technique that I have consistently used is to preserve a vertical column of earth in the central portion of an archaeological site. The column represents a surface-to-base vertical section and allows a decimeter by decimeter section to be removed with the least possible risk of contamination. The surface is usually one meter square, deposits are exposed on all four sides of the column, and the stratigraphic sequence (if such exists) is usually well defined. In addition, the four profiles can be examined for evidence of animal burrows. On the rare occasion (i.e., this has happened only twice in my personal experience) that contamination occurs and is not observed, the samples will show an age inversion. I have purposefully left out two samples from the Spindrifft Site because of this.

TABLE I.

CHRONOLOGICAL SEQUENCE OF RADIOCARBON DATES
ON ARCHAEOLOGICAL SITES IN SAN DIEGO
AND IMPERIAL COUNTIES (1965)

<i>Scripps C-14 Lab. No.</i>	<i>Site Location</i>	<i>Years Before The Present</i>
DIEGUEÑO II	(0 — 400 B.P.)	
LJ-223	Presidio Site	100 ± 150
LJ- 17	Clark Dry Lake	200
LJ-102	Lake Le Conte	220 ± 100
LJ-210	Silver Strand	270 ± 150
LJ- 15	Lake Le Conte	300 ± 100
LJ-897	Witch Creek (UCLJ-M-18)	360 ± 120
LJ- 23	North Coronado Island, Baja Calif.	400
DIEGUEÑO I	(400 — 3,000 B.P.)	
LJ- 95	La Jolla Shores (UCLJ-M-5)	520 ± 150
LJ- 16	Clark Dry Lake	700 ± 150
LJ- 99	Lake Le Conte	760 ± 100
LJ-103	Sweetwater River Midden	760 ± 100
LJ-965	Fish Creek	830 ± 140
LJ-243	Batiquitos Lagoon	825 ± 200
LJ-242	Batiquitos Lagoon	870 ± 200
LJ- 37	Chollas Creek	950 ± 200
LJ-106	Lake Le Conte	960 ± 100
LJ- 7	Fish Creek	1000 ± 200
LJ-335	Agua Hedionda Lagoon	1030 ± 200
LJ 448	SIO Cliff Site	1050 ± 150
LJ-245	Batiquitos Lagoon	1075 ± 150
LJ-386	Spindrifft Site (UCLJ-M-6)	1270 ± 250
LJ-105	Lake Le Conte	1440 ± 100
LJ- 34	Chollas Creek	1450 ± 200
LJ-101	Lake Le Conte	1580 ± 200
LJ-453	SIO Upper Cliff Site (UCLJ-M-7)	1620 ± 160
LJ- 38	Chollas Creek	2100 ± 200

<i>Scripps</i> C-14 Lab. No.	<i>Site Location</i>	<i>Years Before The Present</i>
LJ-968	Torrey Pines Park Site 6	2140 \pm 150
LJ-962	Torrey Pines Park Site 6	2300 \pm 150
LA JOLLA III	(3,000 to 4,000 B.P.)	
LJ-382	SIO Cliff Site	3240 \pm 240
LJ- 35	Batiquitos Lagoon	3500 \pm 200
LJ-914	C. W. Harris Site (SDi 149)	3550 \pm 150
LJ- 19	Torrey Pines Park Site #1	3700 \pm 200
LJ-915	C. W. Harris Site (SDi 149)	3850 \pm 150
LJ- 31	Batiquitos Lagoon	3900 \pm 200
LJ-211	Silver Strand	4020 \pm 300
LJ-595	SIO Upper Cliff Site (UCLJ-M-7)	4090 \pm 200
LJ-901	Scripps Estates Site	4100 \pm 160
LA JOLLA II	(4,000 to 5,500 B.P.)	
LJ-336	Silver Strand	4520 \pm 220
LJ-512	Spindrift Site (UCLJ-M-6)	4650 \pm 260
LJ-909	C. W. Harris Site (SDi 149)	4650 \pm 200
LJ-136	C. W. Harris Site (SDi 149)	4720 \pm 160
LJ-277	Torrey Pines Park Site #2	4740 \pm 200
LJ-912	Batiquitos Lagoon	4750 \pm 200
LJ-276	Torrey Pines Park Site #2	4840 \pm 200
LJ-274	Torrey Pines Park Site #2	4970 \pm 200
LA JOLLA I	(5,500 to 7,500 B.P.)	
LJ-110	Scripps Estates Site	5460 \pm 100
LJ-900	Scripps Estates Site	5680 \pm 250
LJ-221	Scripps Estates Site	5740 \pm 240
LJ-256	Batiquitos Lagoon	6250 \pm 150
LJ-202	C. W. Harris Site (SDi 149)	6300 \pm 290
LJ-225	University of California (UCLJ-M-1)	6370 \pm 210
LJ-275	U.S. Agriculture Station (UCLJ-M-3)	6400 \pm 200
LJ-893	Solana Beach Midden	6600 \pm 300
LJ- 79	Scripps Estates Site	6700 \pm 150
LJ-892	Cardiff Midden	7100 \pm 300
LJ-964	Point Loma (UCLJ-M-24)	7130 \pm 350
LJ- 36	Batiquitos Lagoon	7300 \pm 200
LJ-109	Scripps Estates Site	7370 \pm 100
LJ-961	Agua Hedionda (UCLJ-M-13)	7420 \pm 350
LJ-966	Agua Hedionda (UCLJ-M-13)	7450 \pm 370
LJ-969	Cardiff Midden	7480 \pm 400
LJ-454	SIO Upper Cliff Site (UCLJ-M-7)	7530 \pm 140
LA JOLLA, SAN DIEGUITO TRANSITIONAL?		
(7,500 TO 9,020 B.P.)		
LJ-967	Agua Hedionda (UCLJ-M-#13)	9020 \pm 500

tion of cremation practises among the Diegueño was exhibited at the Witch Creek Site (Table I), where the cremation sector was segregated on a small height 200 yards from the base camp. Cremations took place in shallow, stone-paved pits. After the body had been

reduced, along with mortuary offerings (bows, arrows, food, beads, pendants, etc.), the charcoal, ashes, bone and artifacts were gathered together and placed in an olla, which was then capped and buried at the north extremity of the cremation site. The occurrence

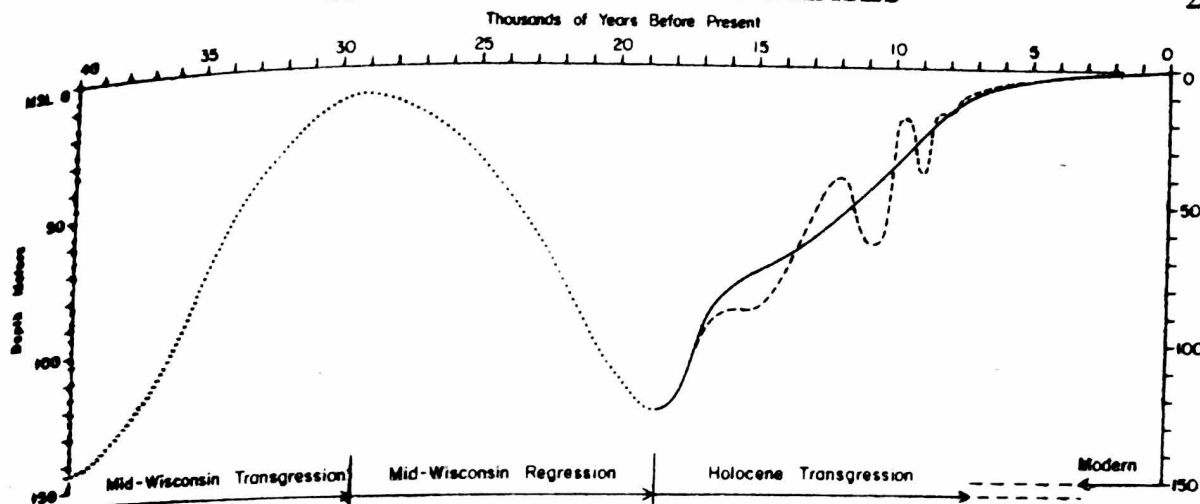


Figure 1.—Late-Quaternary fluctuations of sea level, from compilation of published and unpublished radiocarbon dates and geological evidence. Dotted curve is estimated from minimal data. Solid curve shows the approximate mean of dates compiled. Dash curve is slightly modified from Curray (1960, 1961). Probable fluctuations since 5,000 B.P. are not shown.

of pottery within the boundaries of the Yuman area in San Diego and Imperial Counties has been one of the key indications for the Yuman occupation (Rogers, 1936). Until the discovery of a preceramic Yuman phase on the coast (Moriarty, 1965; 1966); it was assumed that the Yuman hearth site formed along the Colorado River Basin at about 2,000 B.P. (Rogers, 1958; Kroeber, 1920 and 1925). The radiocarbon dates in Table I now demonstrate that there was a distinct preceramic Yuman occupation on the coast at San Diego approximately $2,300 \pm 150$ years B.P. The artifact assemblages from four archaeological sites on the coast show the range of this preceramic period to have been nearly 1,500 years (LJ-385, LJ-962, LJ-968, LJ-38, and LJ-453). The earliest known occurrence of pottery is on the Spindrift Site and dates at $1,270 \pm 250$ B.P. (LJ-386). It would be logical to assume that one could then trace first occurrences of pottery in sites along a line between San Diego and the Colorado River, in which an increasing age for first-pottery-appearance could be demonstrated as one moves eastward toward the hearth-site locale on the Colorado River. There is an insufficient number of radiocarbon dates from sites in the intervening area, although some indication may be gathered from the Lake La Conte Site in the Salton Basin. It shows a

preceramic level dated at $1,580 \pm 260$ B.P. (LJ-101) and a first occurrence of pottery directly above it, dating at $1,440 \pm 100$ B.P. (LJ-105). Continuing programs of sampling by the La Jolla Natural Radiocarbon Laboratory, University of California at San Diego will, I feel, confirm the foregoing.

Diegueño II:

Diegueño II begins approximately 400 years ago with the first contact by Europeans. A decline follows in many of the earlier native crafts. This period is recognized by the occurrence of such trade materials as glass beads, metallic tools, metal buttons, etc. Burial practices are changed wherever European influence (i.e. Missions, etc.) was the controlling factor (Dubois, 1907 and 1908; Mykrantz, 1927; Moriarty, 1961).

Summary

This has been an attempt to make a practical beginning for the use of carefully selected radiocarbon dates from well controlled stratigraphic situations in archaeological sites, at levels where typological changes occur. I am aware that only a small part of the data has been collected in San Diego and Imperial Counties. Nevertheless, I believe, Table I represents a sufficient amount for a statistically valid sample. From such outlines a new and useful tool for the recognition of culture changes and

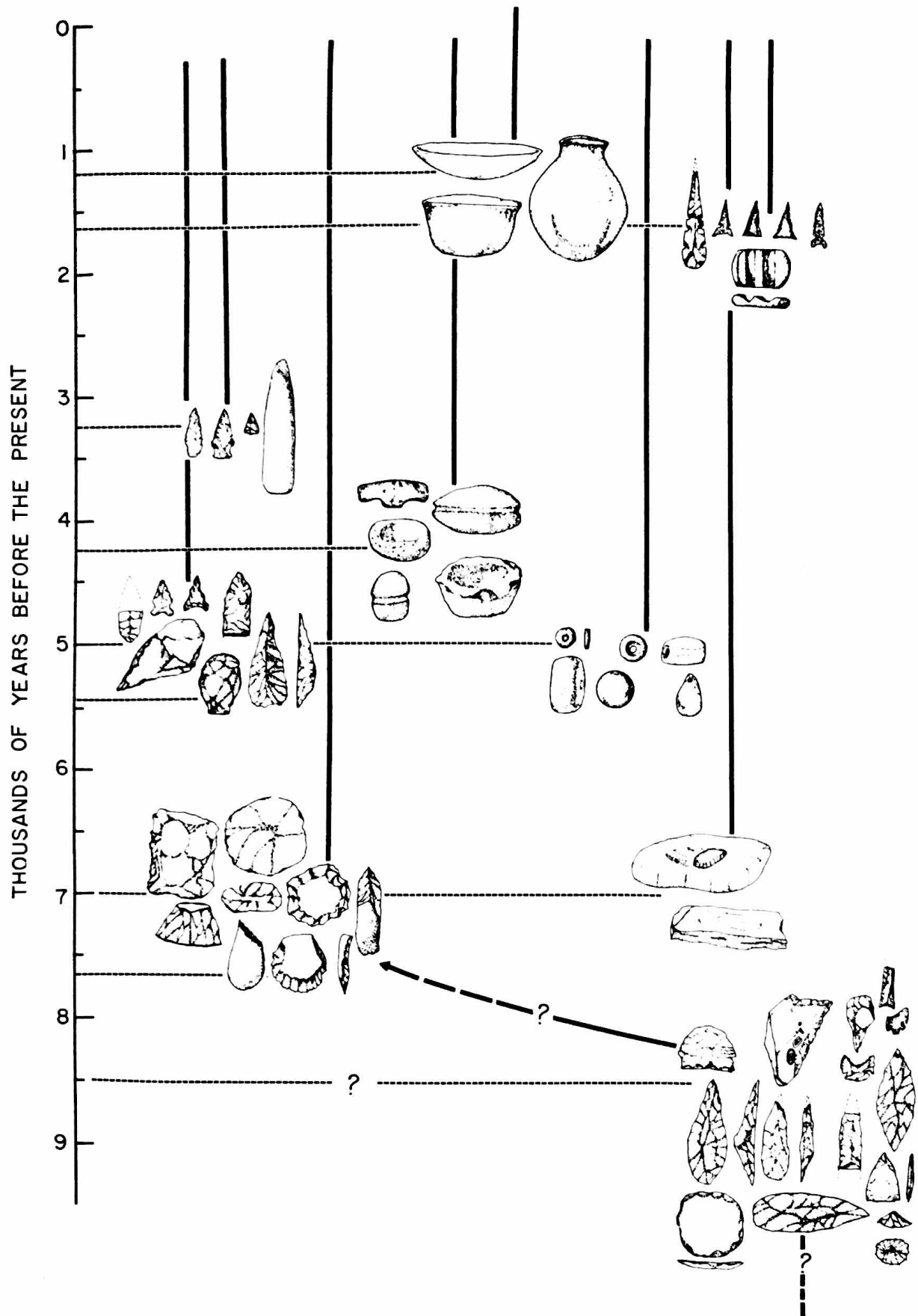
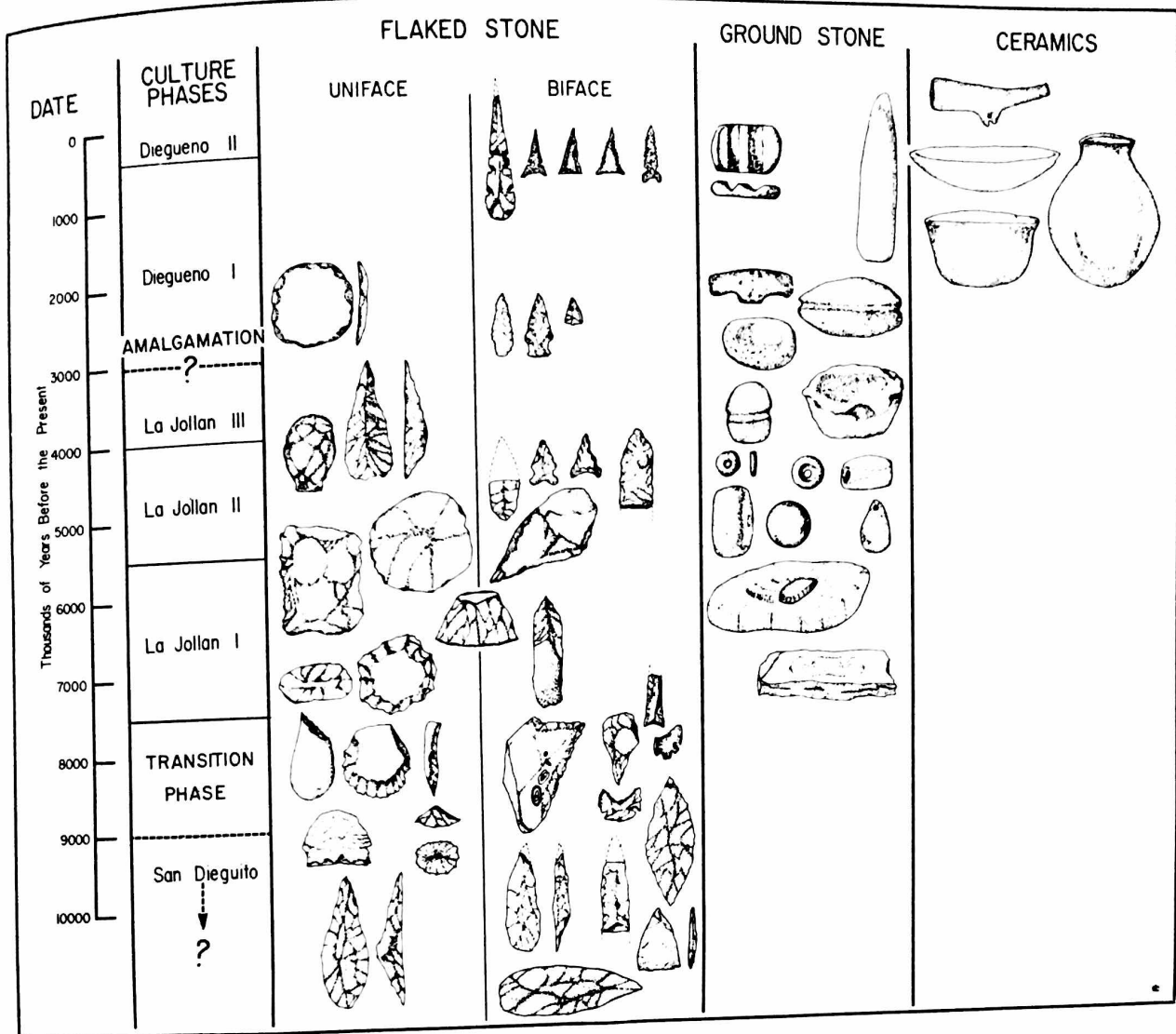


Figure 2.—Schematic representation of the relative date of the first occurrence of various diagnostic artifacts in San Diego County in the last 9,000 years.



- 1962—La Jolla Natural Radiocarbon Measurements II. *American Jour. Science Radiocarbon Suppl.*, v. 4, pp. 204-38.
- 1963—La Jolla Natural Radiocarbon Measurements III. *American Jour. Science Radiocarbon Suppl.*, v. 5, pp. 254-72.
- 1965—La Jolla Natural Radiocarbon Measurements IV. *American Jour. Science Radiocarbon Suppl.*, v. 7, pp. 66-117.
- KROEBER, A. L.
1920—Yuman Tribes of the Lower Colorado. *American Archaeology and Ethnology*, v. 16, no. 8: 475-85. University of California.
- 1925—*Handbook of the Indians of California*. Bureau of American Ethnology, Bull. 78.
- MARSHALL, N. and J. R. MORIARTY
1964—Principles of Underwater Archaeology Pacific Discovery, Sept.-Oct. *California Academy of Sciences*, 8 pp.
- MEIGHAN, C. W.
1965—Pacific Coast Archaeology. VII Congress of the International Association for Quaternary Research, pp. 709-20. Princeton University Press.
- MORIARTY, J. R., G. SHUMWAY, and C. N. WARREN
1960—A Preliminary Report on an Early Site on the San Diego Coast, 1958-1959. *Annual Report, Archaeological Survey, University of California*, pp. 185-216. Los Angeles.
- MORIARTY, J. R. and R. P. BURNS
1963—A Preliminary Reconnaissance of a Pre-Ceramic Site at Avila Beach, San Luis Obispo County, California. *San Diego Science Foundation Occasional Paper No. 1*. San Diego.
- MORIARTY, J. R. and R. S. D. BROMS
1966—The Antiquity and Inferred Use of Stone Spheres in Southern California. *Masterkey*, Southwest Museum (in press).
- MORIARTY, J. R.
1961—The Coast Diegueno, San Diego's Historic Indian. *Cabrillo Historical Society Journal, Western Explorer*, v. I, no. 3, pp. 9-21.
- 1963—The Use of Oceanography in the Solution of Problems in a Submarine Archaeological Site. *Papers in Marine Geology*, R. L. Miller, ed. (Shepard Commemorative Volume). New-York.
- 1965—Cosmogony, Rituals, and Medical Practice Among the Diegueno Indians of Southern California. *Anthropological Journal of Canada*, v. 3, no. 3: 2-16. Ottawa.
- 1966—Evidence of Mat Weaving from an Early La Jolla Site. *Masterkey*, Southwest Museum, v. 40, no. 2: 44-53. Los Angeles.
- MYKRANTZ, J. W.
1927—Indian Burials from Southern California. *Museum of the American Indian, Heye Foundation*, Indian Notes and Monographs 4, pp. 154-63.
- ROGERS, M. J.
1936—Yuman Pottery Making. *San Diego Museum Papers* 2.
- 1939—Early Lithic Industries of the Lower Basin of the Colorado River and Adjacent Desert Areas. *San Diego Museum Papers* 3.
- 1945—An Outline of Yuman Prehistory. *Southwestern Journal of Anthropology*, v. 1, no. 2. University of New Mexico.
- 1958—San Dieguito Implements from the Terraces of the Rincon-Pantano and Rillito Drainage System. *The Kiva* v. 24, no. 1: 1-23. *Journal of the Arizona Archaeological and Historical Society*. Tucson.
- SHEPARD, F. P.
1964—Sea Level Changes in the Past 6,000 Years: Possible Archaeological Significance. *Science*, v. 143, no. 3606: 574-76.
- SHUMWAY, G., C. L. HUBBS, and J. R. MORIARTY
1961—Scripps Estate Site, San Diego, California: A La Jolla Site Dated 5460 to 7370 Years Before the Present. *Annals of the New York Academy of Sciences*, v. 93, pt. 3, pp. 37-132. New York.
- TUTHILL, C. and A. A. ALLENSON
1954—Ocean-Bottom Artifacts. *Masterkey*, Southwest Museum, v. 28, no. 6: 222-31.
- WALLACE, W. J.
1955—A Suggested Chronology for Southern California Coastal Archaeology. *Southwestern Journal of Anthropology*, v. 11, pp. 214-30.
- WARREN, C. N., D. L. TRUE, and O. EUDEY
1961—Early Gathering Complexes of Western San Diego County. *Archaeological Survey Annual Report, 1960-1961*, pp. 1-106. University of California. Los Angeles.
- WARREN, C. N.
1964—*Cultural Change and Continuity on the San Diego Coast*. University of California Ph.D. thesis, 264 pp. Los Angeles.